Platform-Independent Development of Robot Communication Software



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(Mr. Ladarius Stoltenberg)

PLATFORM-INDEPENDENT DEVELOPMENT OF ROBOT COMMUNICATION SOFTWARE



Kassel University Press Feb 2009, 2009. Taschenbuch. Condition: Neu. Neuware - Robotic appliances have gained significant influence in various fields of computer science research during the last fifteen years. New technologies and the availability of suitable hardware in particular boosted advances in robot development. Most recently, mobility and cooperation turned out as new challenges where in particular biologically inspired systems and swarm robotics are involved. Robot control software is considered highly important in this context, involving challenges for robot software architects: The need to master heterogeneity issues and find suitable interaction schemes that are reconcilable with the capabilities of the wireless communication media. This thesis addresses the platform-independent software development of communication infrastructures for mobile robotic systems. The Spica development framework supports the needs of robot software architects by realising a platform-independent development methodology that rests upon the model-orientated software development paradigm. Spica thereby hides implementation details using abstract models. It explicitly takes into account the circumstance that communication may fail or behave unexpectedly. A model transformation approach creates ready-to-use, platformspecific, and optimised software implementations for specific programming languages from the abstract models. Supportive functionality facilitates collaboration between multiple robots. The distributed resource discovery engine Geminga helps establishing the required communication infrastructure. It also takes care of dynamic reconfiguration. In order to facilitate the development of distributed software architectures, Spica provides a decentralised monitoring facility for logging and monitoring in highly dynamic environments. Rigorous theoretical and experimental evaluation finally shows the viability of the Spica development approach. 205 pp. Englisch.



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